

Vaccine Preventable Infections

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Vaccine Preventable Infections

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Due to vaccines, many infectious diseases that were once common in this country are now significantly reduced and controlled. The viruses and bacteria that cause vaccine-preventable diseases, however, still exist and can be passed on to people who are not protected by vaccines. At the turn of the century, infectious diseases were widely prevalent in the United States. In 1900, 21,064 smallpox cases were reported, and 894 patients died.¹ Today, smallpox has been eradicated from the earth. This has been recognized as a great public health achievement and surely illustrates the positive impact vaccines can make on the health of all people.

Vaccine-preventable diseases have a costly impact, resulting in doctor's visits, hospitalizations, time lost from work, and premature deaths. National efforts to promote vaccine use among all children began with the appropriation of federal funds for polio vaccination after introduction of the vaccine in 1955 (5). Since then, federal, state, and local governments and public and private health-care providers have collaborated to develop and maintain the vaccine-delivery system in the United States.(5)

- Adequately Immunized Children
- School Entry Immunizations
- Adolescent Vaccinations
- 2nd Dose MMR
- Hepatitis A
- Hepatitis B
- Flu & Pneumonia

5. Plotkin SA, Orenstein WA. Vaccines. 3rd ed. Philadelphia, Pennsylvania: WB Saunders Co., 1999.

This section highlights the following immunization topics.

Adequately Immunized Children

Definition: Vaccination coverage levels: number of children, up to age two, that are adequately immunized. Adequately immunized is defined as having had 4 DTaP/DTP/DT, 3 Polio, and 1 MMR by 24 months-of-age.

How are we doing? The level of adequately immunized two-year-olds has been increasing every year since 1996. Percentages have increased dramatically from 64% in 1996 to 81.7% in 1999. Utah has gone from ranking 51st to 22nd in the nation in 2 year old immunization levels.¹

How does Utah compare with the U.S.? In 1999, the immunization level for 2 year-olds in the United States was 79.9%. Utah's immunization level was 81.7%.

Why is it important? Children need 80% of their immunizations in the first two years of life to protect them against disease, disability, and even death. Immunizations are among the most cost-effective health prevention measures and reduce the possibility of vaccine preventable disease and outbreaks. For every dollar spent, \$26 dollars can be saved in direct and indirect medical costs.² Immunizations are identified by the Centers for Disease Control as one of the Ten Great Public Health Achievements in the United States in the 20th Century.

National and State Objective:

Achieve and maintain effective vaccination coverage levels for universally recommended vaccines among young children.

CFHS Objective: Maintain effective vaccination coverage levels for universally recommended vaccines among young children.

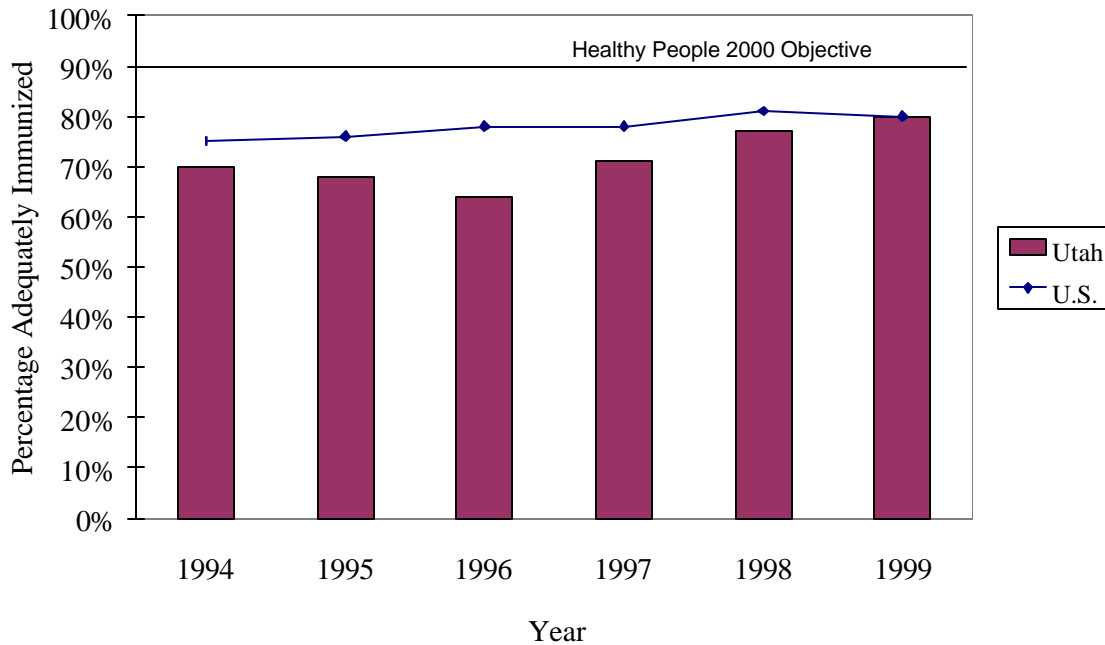
What are the risk factors?

- ✓ Problems with record keeping
- ✓ Children going to numerous providers
- ✓ Limited participation in the immunization registry
- ✓ Disease outbreaks
- ✓ Acquiring vaccine preventable diseases
- ✓ Large families

What are we doing? Annual assessments of private and public health care providers are being conducted. Utah's immunization coalitions are helping to maintain levels and increase public awareness of immunizations on a state and local level. Utah's First Lady Jacalyn Leavitt is a champion for children's immunization issues. The Every Child By Two Coalition is a model of the effectiveness of public private partnerships utilizing a statewide media campaign – "Immunize By Two, It's Up to You." Other efforts include the Hallmark Greeting Card Program, Care-A-Van, which is a mobile immunization unit, a recall reminder effort, and the development of the Utah Statewide Immunization Information System (USIIS). USIIS is a system that harnesses Internet technology to assist physicians, local health

Figure 1:

Two-Year Old Immunization Rate
Percentages of Children ages 19-35 Months Old who had Completed Immunizations*, Utah and U.S., 1994-1999



*Completed immunizations based on the 4:3:1 schedule, which includes 4 doses of DtaP/DTP/DT (Diphtheria/Pertussis/Tetanus), 3 of polio, and 1 of MMR (Measles/Mumps/ Rubella).
Source: National Immunization Survey, CDC.

departments, and community health centers with record keeping. The program is expanding and will be available to all immunization providers. ♦

School Entry Immunizations

Definition: To attend a Utah school, a student must meet the minimum immunization requirements for the following antigens: diphtheria, tetanus, pertussis, polio, measles, mumps, and rubella. As of July 1, 1999, students entering kindergarten are also required to have three doses of hepatitis B.

How are we doing? At the end of 1999, more than three-quarters of Utah's two-year-old infant population had been immunized. Preliminary reports indicate that nearly 80% were immunized. The final 1998 report from the Centers for Disease Control and Prevention shows that Utah's infant immunization rate improved from 71% in 1997 to 77% in 1998. In addition, about 95.6% of Utah children in 1999 were adequately immunized by school entry.

How does Utah compare with the U.S? An immunization assessment of school entry (kindergarten) is conducted annually in all public, private, and parochial schools. In 1999, the report revealed that in Utah, 92% were adequately immunized.³ The national average in 1999 was 95%.¹

Why is it important? Maintenance of high vaccination coverage levels in early childhood is the best way to prevent the spread of vaccine preventable diseases (VPDs) and to provide the foundation for controlling VPDs among adults. The prevention of childhood diseases by immunization is one of the most cost-effective measures of all preventive health strategies. The Centers for Disease Control

National Objective: Maintain vaccination coverage levels for children in licensed day care facilities and children in kindergarten through the first grade.

CFHS Objective: Current progress is aimed at achieving 95% coverage levels for children in licensed day care facilities and children in kindergarten through the first grade.

and Prevention estimates that for every dollar spent on immunizations, approximately \$26 dollars is saved in direct and indirect health care costs.² Entry requirements for school and day care are one of the most effective interventions states have to ensure children are appropriately immunized.

What are the risk factors? Risk factors for lower immunization rates include:

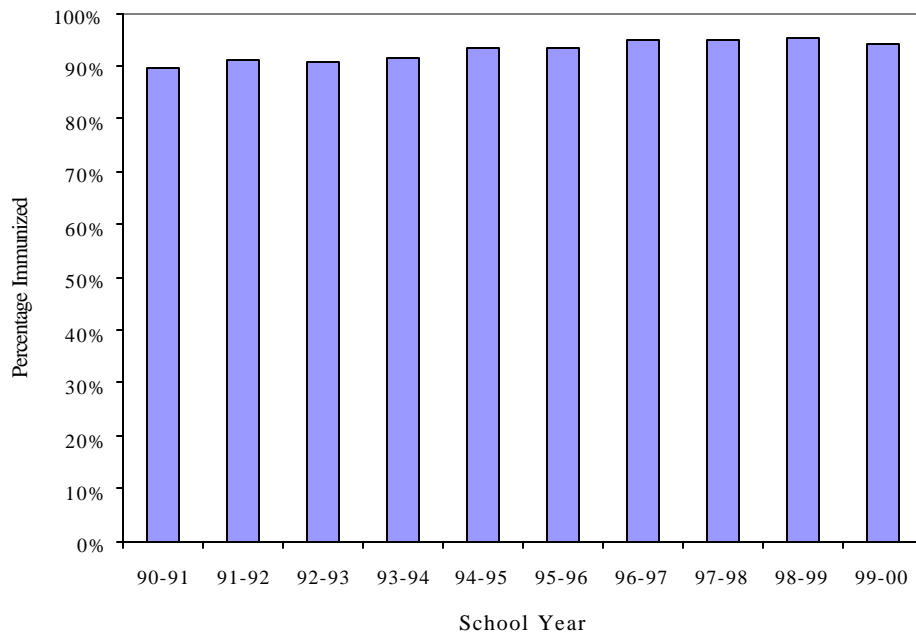
- ✓ Complex immunization schedule
- ✓ Family size and birth spacing
- ✓ Parents' age and level of education
- ✓ Income
- ✓ Utah's high birth rate (number 1 in the U.S.)
- ✓ High percentage of working mothers
- ✓ Lack of experience with the impact of vaccine preventable diseases
- ✓ Lack of transportation
- ✓ Lack of information regarding clinic locations and operating hours

What are we doing? Integration of immunization services and information systems are being pursued by:

- ✓ Expanding the Utah Statewide Immunization Information System (USIIS) to provide electronic

Figure 2:

Children Enrolled in Licensed Child Care Centers Who Are Adequately Immunized, Utah, 1990-2000



UDOH Immunization Program data (1990-2000)

immunization histories for children under two years of age, not only to the twelve local health districts but also to approximately 250 private vaccine provider sites.

- ✓ Promoting integration of immunization services with well-child care and WIC services at local health department clinics.

Immunization education efforts will be carried out in hospitals, primary care provider sites, clinics, schools, and day care facilities. Five key strategies for sustainable rates are:

1. Voluntary employer and health plan coverage, and meetings scheduled with health plans and employers where they will be asked to voluntarily commit to provide first dollar coverage for childhood vaccines
2. Immunization registry and outreach, public/private partnerships, and voluntary registry of childhood immunizations
3. Administrative simplification, decrease in reporting requirements for all providers through registry, and placement of public health vaccines in private provider offices
4. Provider process improvements, review of rates within private and public clinics, identification of barriers, missed opportunities, and more immediate and accurate information from registry
5. Parent education and incentives, media campaign –“Immunize By Two, It’s Up To You,” and drawings for trips and prizes ♦

Adolescent Vaccinations

Definition: Number or percentage of adolescents 11-19 years of age who are adequately immunized with the recommended adolescent vaccines such as measles, tetanus, chickenpox and hepatitis B.

How are we doing? Data for adolescent immunization coverage levels are not routinely available. However, in 1999, school data for adolescents in Utah indicate a coverage level of 96.7% for the second dose measles vaccine.³

How does Utah compare with the U.S.? **Hepatitis B:** In the U.S., over 70% of the 100,000-140,000 new cases of hepatitis B each year strike adolescents and young adults. The percent of Hepatitis B cases among adolescents increased from 3% in 1996 to 21% in 1999.

Measles: Of the 575 measles patients in the United States during 1996 for whom age was known, one-third were ages 10-19. From 1996 to 1999, the percent of measles cases that occurred among adolescents in Utah decreased from 60% to 0%.

Chicken Pox (Varicella): In the United States, approximately 20% of adolescents ages 11-12 have not had chickenpox. Utah coverage levels for the chickenpox vaccine in adolescents is estimated to be 20%.

National Objective: Increase routine vaccination coverage levels of adolescents.

CFHS Objective: Develop strategies to increase adolescent immunization levels.

Why is it important? Immunization programs have dramatically decreased the occurrence of many vaccine-preventable diseases. However, diseases such as hepatitis B, rubella, and measles remain problematic within the adolescent population. Adolescents are 10 times more likely than children to develop severe complications when infected with chickenpox. Vaccines are one of the most effective methods for preventing disease outbreaks that occur in high-risk adolescent populations.

What are the risk factors?

Vaccine preventable diseases:

- ✓ Adolescents with diabetes and chronic heart, liver, kidney or lung conditions (including asthma) need protection from vaccine preventable diseases
- ✓ Lack of education concerning adolescent health needs
- ✓ Physicians not following up on recommended adolescent immunizations

Hepatitis A

- ✓ Geographical location – the western states are at particular increased risk for contracting hepatitis A (Utah ranks fifth in the nation in hepatitis A cases)

Hepatitis B

- ✓ Intravenous drug use
- ✓ Multiple sexual partners
- ✓ Men who have sex with men

What are we doing? CFHS supports the promotion of adolescent immunization through the Utah Immunization Program. Activities include:

- ✓ Statewide adolescent immunization awareness campaigns
- ✓ School-based adolescent immunization initiatives
- ✓ Legislation requiring all students (including junior high and high school) receive 2 doses of the measles vaccine prior to school entry
- ✓ Reduced vaccine costs for the refugee population
- ✓ Collaboration with STD clinics to screen and vaccinate high-risk patients
- ✓ Recommendations for immunization providers to implement routine immunization screenings at the adolescent health care visit and establishment of the Utah Vaccines For Children (VFC) Program

The VFC Program provides vaccines at significant cost savings for persons 0-18 years of age who are on Medicaid, have no insurance or are Alaskan Native or American Indian.

Contextual and additional information: The Association for Utah Community Health (AUCH), the Utah Clinicians Network (UCN) and other national partners

were awarded funding by the Centers for Disease Control and Prevention (CDC) and the Bureau of Primary Health Care (BPHC) to develop and conduct an Adolescent/Adult Immunization Quality Improvement Project. The initial goal of this project was to develop a methodology for assessing adolescent and adult immunization rates in community/migrant health centers in New York, New Jersey and Utah. Activities included working with participating project

Recommended Adolescent Immunizations:

- ✓ Hepatitis B – if not previously vaccinated
- ✓ 2nd Dose Measles
- ✓ Booster of Tetanus (Td)
- ✓ Varicella – if no reliable history of chickenpox
- ✓ Hepatitis A – in selected areas (Utah being a high risk area)

sites and county, state and city health departments to identify and document issues that have an impact on the delivery of adolescent and adult immunizations in primary care. The participating health centers will be provided center-specific intervention strategies aimed at increasing baseline rates, active and ongoing technical assistance, and periodic re-measurement and feedback. The project will also involve the development of clinical assessment software that will be used in assessing immunization rates nationally. ♦

2nd Dose MMR

(Measles, Mumps, Rubella)

Definition: Measles is an acute, highly contagious viral disease spread via the respiratory tract. Measles is characterized by cough, fever, coryza, conjunctivitis, and rash. Complications include diarrhea, otitis media, pneumonia, encephalitis, seizures or death in 30% of reported cases. Mumps is an acute viral disease characterized by fever, swelling, and tenderness of one or more salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. Central nervous system involvement including meningitis and encephalitis may occur as a complication. Mumps is one of the leading causes of acquired sensorineural deafness in childhood. Rubella is an acute viral disease that may affect susceptible persons of any age. Although generally mild in children, rubella may be associated with significant morbidity in adults and is associated with a high rate of fetal wastage or anomalies in the early months of pregnancy.

How are we doing? Utah did not have a measles case reported in 1998. However, in 1996, Utah reported the highest number of measles cases in the U.S. Utah also reported large outbreaks in 1989-1991. However, vaccination levels for the second dose of measles are improving from 67.8% in 1996-1997 to 72.0% in 1997-1998.

How does Utah compare with the U.S.? Utah reported the highest number of measles cases among all states in 1996 with 118 confirmed cases. Utah has had other large outbreaks in the past.³

Why is it important? The prevention of childhood diseases through immunization is one of the most cost-effective measures of

National Objective: (Developmental)
Increase routine vaccination coverage levels of adolescents (specifically second dose MMR).

CFHS Objective: By 2000, 90% of kindergarten through twelfth grade students will have received two doses of measles-containing vaccine as a measure of increasing vaccination coverage levels.

all preventive health strategies. Related costs for the 1996 measles outbreak were estimated at over \$600,000. Measles outbreaks will continue to be a problem in Utah as long as a considerable number of children have not received their second dose measles vaccine. Vaccines are typically very effective and safe. The Measles, Mumps, and Rubella (MMR) vaccine for example is approximately 98% effective when two doses are given. Maintenance of high vaccination coverage levels in early childhood and adolescence is the best way to prevent the spread of vaccine preventable diseases (VPDs) in children and to provide the foundation for controlling VPDs among adults. Diseases such as measles can eventually be eradicated or at least eliminated through persistent high vaccination coverage.

What are the risk factors?

- ✓ Lack of education concerning adolescent health needs
- ✓ Physicians not following up on needed adolescent immunizations
- ✓ Lack of transportation
- ✓ Lack of information regarding clinic locations and operating hours
- ✓ Family size and birth order
- ✓ Income
- ✓ High percentage of working mothers

- ✓ Parents' level of education
- ✓ Parents' age
- ✓ Inability to reach at-risk adolescents in urban and rural areas

5. Parent education and incentives, media campaigns focusing on adolescent health issues, and drawings for trips, prizes, etc. ♦

What are we doing? Partnerships between schools and local health departments are encouraged to promote adolescent immunizations. In addition, strict enforcement of school vaccination requirements has been shown to play a key role in lowering new cases of measles. Integration of immunization services and information systems are being pursued by expanding the Utah Statewide Immunization Information System to provide electronic immunization histories of children to schools as well as immunization providers. Immunization education efforts will be carried out in hospitals, primary care provider sites, clinics, and schools. Five key strategies for sustainable improvement in childhood immunization rates are:

1. Voluntary employer and health plan coverage and meetings scheduled with health plans and employers where they will be asked to voluntarily commit to provide first dollar coverage for childhood vaccines
2. Immunization registry and outreach, public/private partnerships, and voluntary registry of childhood immunizations
3. Administrative simplification, decrease in reporting requirements for all providers through registry, placement of public health vaccines in private provider offices
4. Provider process improvements, review of rates within private and public clinics, identification of barriers, missed opportunities, and more immediate and accurate information from registry

Hepatitis A

Definition: Hepatitis A is an acute illness with discrete onset of symptoms and jaundice or elevated serum aminotransferase levels. Hepatitis A infection is acquired through the fecal-oral route by either person-to-person contact or ingestion of contaminated food or water.

How are we doing? Hepatitis A is on the decline in Utah. In 1997 the hepatitis A rate was 26.9 per 100,000, and in 1998 the rate was 9.3 per 100,000. Hepatitis A outbreaks tend to run in cycles. Even though the rate was lower in 1998, there is a need to be vigilant in immunizing people against this disease.⁴

How does Utah compare with the U.S.? In 1996, Utah's hepatitis A rate per 100,000 was 53.6, which was two times the national rate of 23.9 cases per 100,000.^{1,3}

Why is it important? Hepatitis A infection results in substantial cost for medical care and work loss. Adults, who become ill, lose an average of 27 workdays per year. Of those with Hepatitis A, 11% to 22% will be hospitalized. The incidence of reported hepatitis A is substantially higher in the western United States than in other parts of the country. The Advisory Committee on Immunization Practices (ACIP) vaccination recommendations for 1999 suggest that all children in states with case rates greater than 20 per 100,000 should be vaccinated.⁵

National Objective: Reduce hepatitis A.

CFHS Objective: Encourage children and adults to receive hepatitis A vaccination.

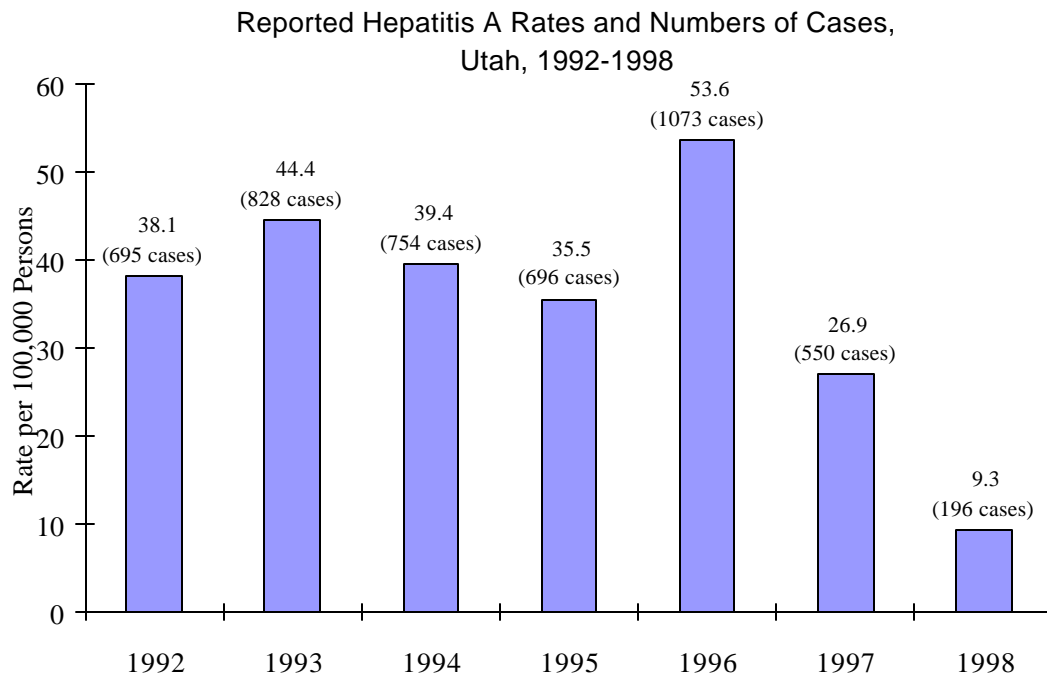
What are the risk factors? Risk factors for hepatitis A or its complications include:

- ✓ Geography (western states)
- ✓ International travelers
- ✓ Men who have sex with men
- ✓ Illegal drug users

Children with hepatitis A generally have no symptoms or the illnesses goes unrecognized, putting household members or other close contacts at risk. Half of all people infected with hepatitis A have no identified source of infection.

What are we doing? The Utah Scientific Vaccine Advisory Committee has made recommendations for a school entry law requiring hepatitis A immunization for all children entering kindergarten. This is now being looked at in terms of cost to local health departments. Hepatitis A vaccine is available through the Utah Vaccines for Children (VFC) for all children over 2 years of age that qualify for that program. All travelers are encouraged to receive hepatitis A before traveling. ♦

Figure 3:



Source: Utah Department of Health, Bureau of Epidemiology

Hepatitis B

Perinatal Hepatitis B Prevention Project

Definition: Hepatitis B is a viral infection of the liver. The severity of this infection ranges from inapparent cases to fatal cases of acute hepatic necrosis. It is transmitted through blood and body fluids of an infected person.

How are we doing? In Utah, 93% of newborns of identified HBsAg positive mothers received appropriate treatment in 1996. Forty-six percent of newborns of identified HBsAg positive mothers received appropriate treatment in 1998.³ Rates of perinatal cases identified vary from state to state.

Why is it important? Infants born to mothers with hepatitis B are at great risk for contracting the disease. By identifying these mothers and appropriate treatment, the risk of transmission from mother to child can be reduced. If a mother is positive for both HBsAg and HBeAg, 70% - 90% of infants will become infected. The risk of perinatal transmission drops to 20% if the mother is positive only for HBsAg. Up to 90% of these infected infants will become hepatitis B carriers. An estimated 25% of these carriers will ultimately die of liver failure secondary to chronic active hepatitis, cirrhosis, or primary hepatocellular carcinoma.

What are the risk factors? Infants born to HBsAg positive mothers are at extreme risk. The risk of chronic infection with hepatitis B is related inversely to the age at the time infection occurs. Transmission from

National Objective: Reduce chronic hepatitis B virus infections in infants and young children (perinatal infections).

CFHS Objective: Identify and treat hepatitis B surface antigen (HBsAg) positive women, their infants, and household contacts.

mother to infant during the perinatal period occurs in infants born to HBsAg positive mothers. If not infected during the perinatal period, infants of HBsAg positive mothers remain at high risk of acquiring chronic hepatitis B infection by person-to-person transmission during the first 5 years of life.

What are we doing? In 1988, ACIP (the Advisory Committee on Immunization Practices) recommended that all pregnant women should be routinely tested for HBsAg during an early prenatal visit in each pregnancy. The Utah Department of Health Perinatal program works with the local health departments to identify and track HBsAg positive mothers and their contacts. HBIG and 1st dose hepatitis B is provided to these infants. All hospitals are being encouraged to reinstate 1st dose hepatitis B vaccine to all newborns.♦

Flu & Pneumonia

Vaccination for Adults

Definition: Number or percentage of institutionalized and non-institutionalized adults 65+ years of age that receive annual influenza vaccination and have ever received the pneumococcal vaccine.

How are we doing? From 1995 to 1997, the percentage of non-institutionalized adults 65+ years of age in Utah receiving annual influenza vaccination varied from 70.2% in 1995, 66.1% in 1997, and 75% in 1999. For the same period, the percentage of non-institutionalized adults 65+ years of age that had ever received a pneumococcal vaccination increased from 42.7% in 1995 to 48.5% in 1997, and to 61% in 1999. Data for institutionalized adults are not available.⁶

How does Utah compare with the U.S.? The percentage of non-institutionalized adults 65+ years of age in Utah during 1997 receiving annual influenza vaccination exceeds the percentage in the U.S. (Utah - 66.1% versus U.S.- 65.9%). The percentage of non-institutionalized adults 65+ years of age in Utah during 1997 that ever received a pneumococcal vaccination also exceeds the percentage in the U.S. (Utah - 48.5% versus U.S.- 45.8%). Data for institutionalized adults are not available.^{6,7}

Why is it important? Over 90% of deaths in the U.S. attributed to influenza or pneumonia occurred among persons 65 years of age or older, particularly those with chronic medical diseases. Pneumococcal

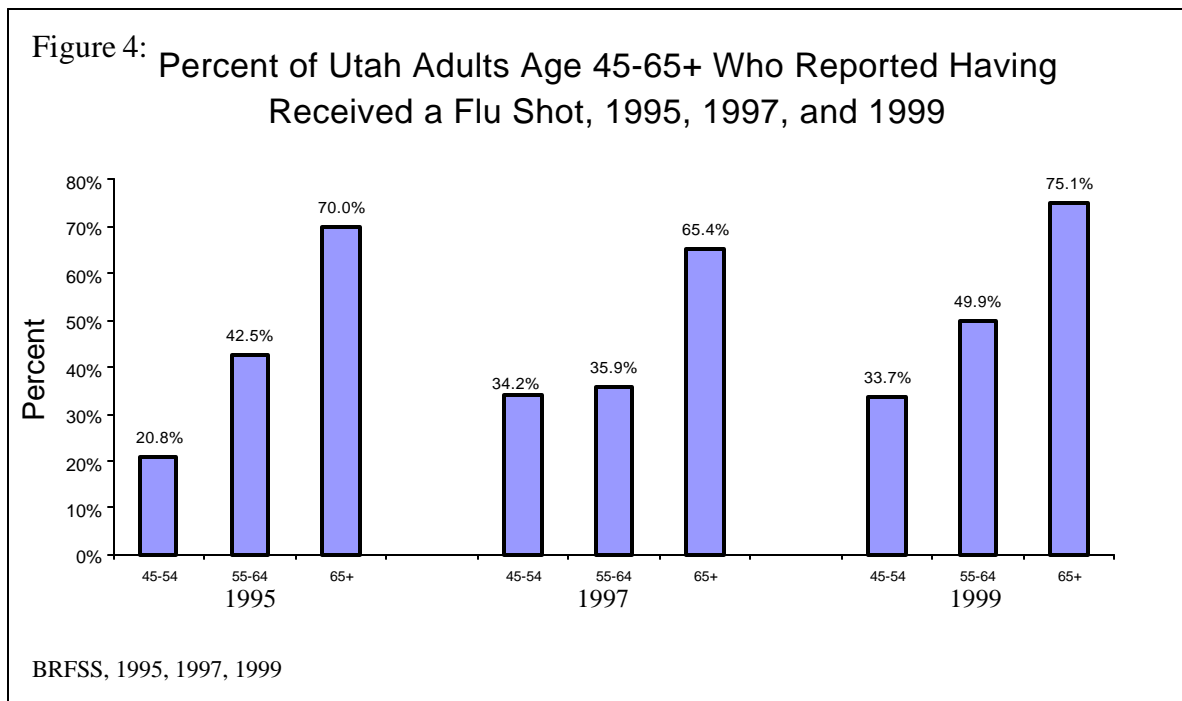
National Objective: By 2010, increase the proportion of adults who are vaccinated annually against influenza and ever vaccinated against pneumococcal disease to 60%.

CFHS Objective: By 2010, increase immunization levels to 60% for pneumococcal and influenza vaccines among adults age 50 and over.

disease accounts for more deaths than any other vaccine-preventable bacterial disease. Vaccines are one of the most effective health intervention tools available and can prevent serious and sometimes fatal effects of infectious diseases. Vaccines can protect more than the individual - they also protect society. Individuals who cannot be vaccinated (persons with contraindications to vaccination) are often indirectly protected because of those who have received vaccination. High vaccination levels reduce the threat of disease to those who are susceptible. Additionally, vaccines are cost-effective reducing medical expenses and improving health. Immunization of the elderly can reduce hospitalizations for pneumonia and influenza by 20% to 70% and death by about 85% among the elderly who are not in nursing homes as well as increase the number of quality days of life by 1.21 days per person vaccinated.

What are the risk factors? Risks related to influenza and pneumococcal diseases include persons with:

- ✓ Diabetes, renal, cardiovascular, and lung diseases
- ✓ Decreased access to health care or lack of insurance coverage
- ✓ Inadequate knowledge about vaccine-preventable diseases and vaccines



- ✓ Missed opportunities to vaccinate (e.g., at office visits and during hospitalizations)
- ✓ Minority barriers (ethnic groups such as Hispanics and non-Whites are less likely to receive influenza and pneumococcal vaccination than Whites)

What are we doing? CFHS supports the national recommendations of the Advisory Committee on Immunization Practices (ACIP) to improve influenza and pneumococcal immunization levels, especially among the high-risk adults through the Utah Immunization Program. Activities include:

- ✓ Statewide adult immunization awareness campaigns
- ✓ Supporting local public health departments in promoting adult immunization
- ✓ Reduced cost for influenza vaccine through state contracts
- ✓ Supporting strategies to implement statewide protocols for administering

influenza and pneumococcal vaccine in long-term care facilities

- ✓ Improving access to influenza and pneumococcal vaccination through pharmacy programs

In conjunction with the recommendations by the Centers for Disease Control and Prevention (CDC) and the National Coalition for Adult Immunization (NCAI), the Utah Immunization Program participates in a statewide Adult Immunization Coalition in Utah. The coalition is comprised of various public and private representatives in areas such as the American Association of Retired Persons, pharmaceutical companies, pharmacy programs, health care plans, a state peer review organization, hospital associations, and the Utah Department of Health. ♦

¹ Fenner F, Henderson DA, Arita I, Jezek Z, Ladnyi ID. Smallpox and its eradication. Geneva, Switzerland: World Health Organization, 1988.

National Immunization Survey, CDC (1999).

² Hadler, Stephen (1994, December). Cost Benefit of Combining Antigens. Biologicals. Vol 122, No. 4, 415-418.

³ Immunization Program, Utah Department of Health.

⁴ Utah Department of Health, Bureau of Epidemiology.

⁵ Epidemiology and Prevention of Vaccine Preventable Diseases, 6th Edition. Centers for Disease Control and Prevention, Atlanta, Georgia

⁷ Utah Behavioral Risk Factor Surveillance System.

⁶ National Behavioral Risk Factor Surveillance System.